

Spot Safety Project Evaluation

Project Log # 200407197
Spot Safety Project # 03-96-203

**Spot Safety Project Evaluation, of the Post Mounted “Vehicle Entering When Flashing” Signs
At the Intersection of US 421 and NC 210 Near Currie, Pender County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
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Principal Investigator

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03/24/2005
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 03-96-203 – The Intersection of US 421 and NC 210, near Currie, Pender County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis and an Odds Ratio comparison analysis has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of post mounted “Vehicles Entering When Flashing” signs with actuated flashers on US 421. The signs are placed in the right and median shoulders of both US 421 approaches. Mr. Dale Privette, P.E., Area Traffic Engineer, originally requested the improvements. US 421 is a four-lane divided facility with an additional left and right-turn lane on each approach of the treatment intersection. NC 210 is a two-lane facility at the intersection with US 421. Both roadways have a posted speed limit of 55 mph in the vicinity of the intersection. The subject location is controlled by dually posted stop signs on NC 210. A convenience store is located in the southwest quadrant of the intersection.

The signs were installed after two fatalities and other severe accidents occurred at this intersection. Motorists crossing US 421 on NC 210 were being stuck by motorists on US 421 in the far lanes, resulting in severe Angle type accidents. The initial crash analysis for this location was completed from July 1, 1992 through June 30, 1996 with a total of 12 reported crashes. There were nine Angle Crashes, two Left Turn-Same Roadway Crashes, and one Right Turn-Cross Traffic Crash. Two fatalities, one Class A injury, five Class B injuries, and nine Class C injuries resulted from these crashes. The final completion date for the improvement at the subject intersection was on February 17, 1998.

Comparison Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from January 1, 1998 through March 31, 1998. The before period consisted of reported crashes from June 1, 1992 through December 31, 1997 (5 Years, 7 Months) and the after period consisted of reported crashes from April 1, 1998 through October 31, 2003 (5 Years, 7 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersections of US 421 at SR 1120-Malpass Corner Road, US 421 at SR 1113-Montague Road, and US 421 at SR 1114-Blueberry Road. Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. Please note that Angle Crashes were the target crashes for the applied countermeasure.

Treatment Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	21	13	- 38.1
Total Severity Index	15.00	12.52	- 16.5
Angle Crashes	13	10	- 23.1
Angle Severity Index	22.48	14.50	- 35.5
Volume	5500	6900	25.5

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	18	23	27.8
Total Severity Index	17.74	9.12	- 48.6
Angle Crashes	11	10	- 9.1
Angle Severity Index	19.49	7.66	- 60.7
Volume	4300	5500	27.9

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	21	13	---
Comparison Total Crashes	18	23	- 51.6 %
Treatment Angle Crashes	13	10	---
Comparison Angle Crashes	11	10	- 15.4 %

The naive before and after analysis at the treatment location resulted in a 38.1 percent decrease in Total Crashes, a 16.5 percent decrease in the Total Severity Index, and a 25.5 percent increase in Average Daily Traffic (ADT). The comparison locations experienced a 27.8 percent increase in Total Crashes, a 48.6 percent decrease in the Total Severity Index, and a 27.9 percent increase in ADT. The before period ADT year was 1995 and the after period ADT year was 2001.

The Odds Ratio is used as another means of calculating the treatment effect. The number of crashes in the before and after period from the Comparison is used to calculate the percent reduction in crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 51.6 percent decrease in Total Treatment Intersection crashes and a 15.4 percent decrease in Angle Treatment Intersection crashes.

Results and Discussion

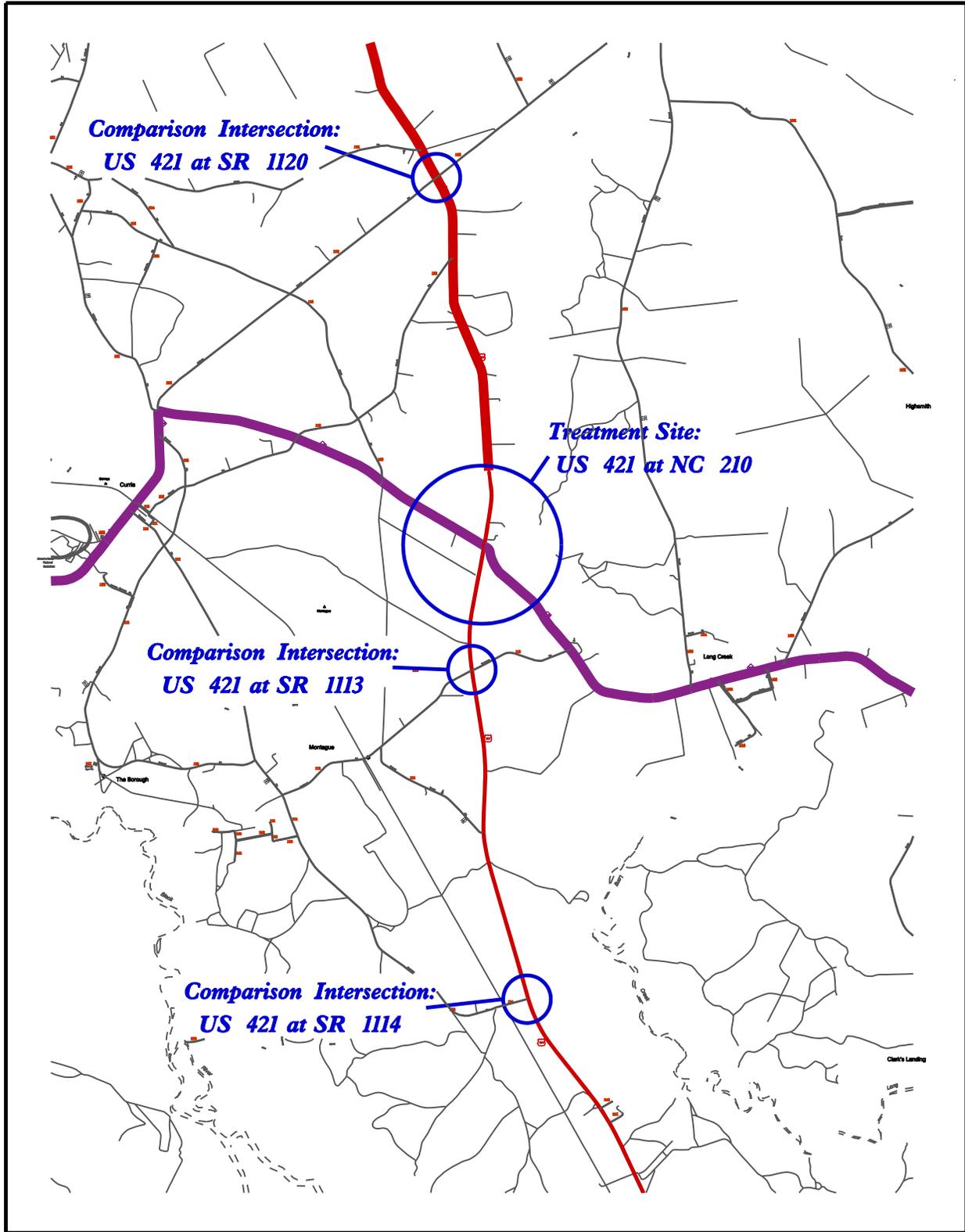
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 38.1 percent decrease in Total Crashes and a 23.1 percent decrease in Angle Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 51.6 percent decrease in Total Crashes and a 15.4 percent decrease in Angle Crashes at the Treatment Intersection.

The summary results above demonstrate that the treatment location appears to have had a decrease in the number of crashes from the before to the after period. The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 38.1 percent decrease to a 51.6 percent decrease in crashes. The countermeasure crash reduction for Angle Crashes at the subject intersection can be in the range of an 15.4 percent decrease to a 23.1 percent decrease in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

Please see the attached Treatment Site Photos. Photos are provided for each leg of the intersection, including photos of the “Vehicle Entering When Flashing” signs on both approaches of US 421. During the site visit, the flashers located on each sign were flashing continuously, even with no traffic present. Also notice the gas station located in the southwest quadrant of the intersection.

Location Map, Pender County

Evaluation of Spot Safety Project Number 03-96-203



Treatment Site Photo (Taken on December 15, 2004)



Looking north on US 421



Looking north on US 421 (Notice *Vehicle Entering When Flashing* signs)

Treatment Site Photo (Taken on December 15, 2004)



Looking south on US 421



Looking south on US 421 (Notice *Vehicle Entering When Flashing* signs)

Treatment Site Photo (Taken on December 15, 2004)



Looking east on NC 210

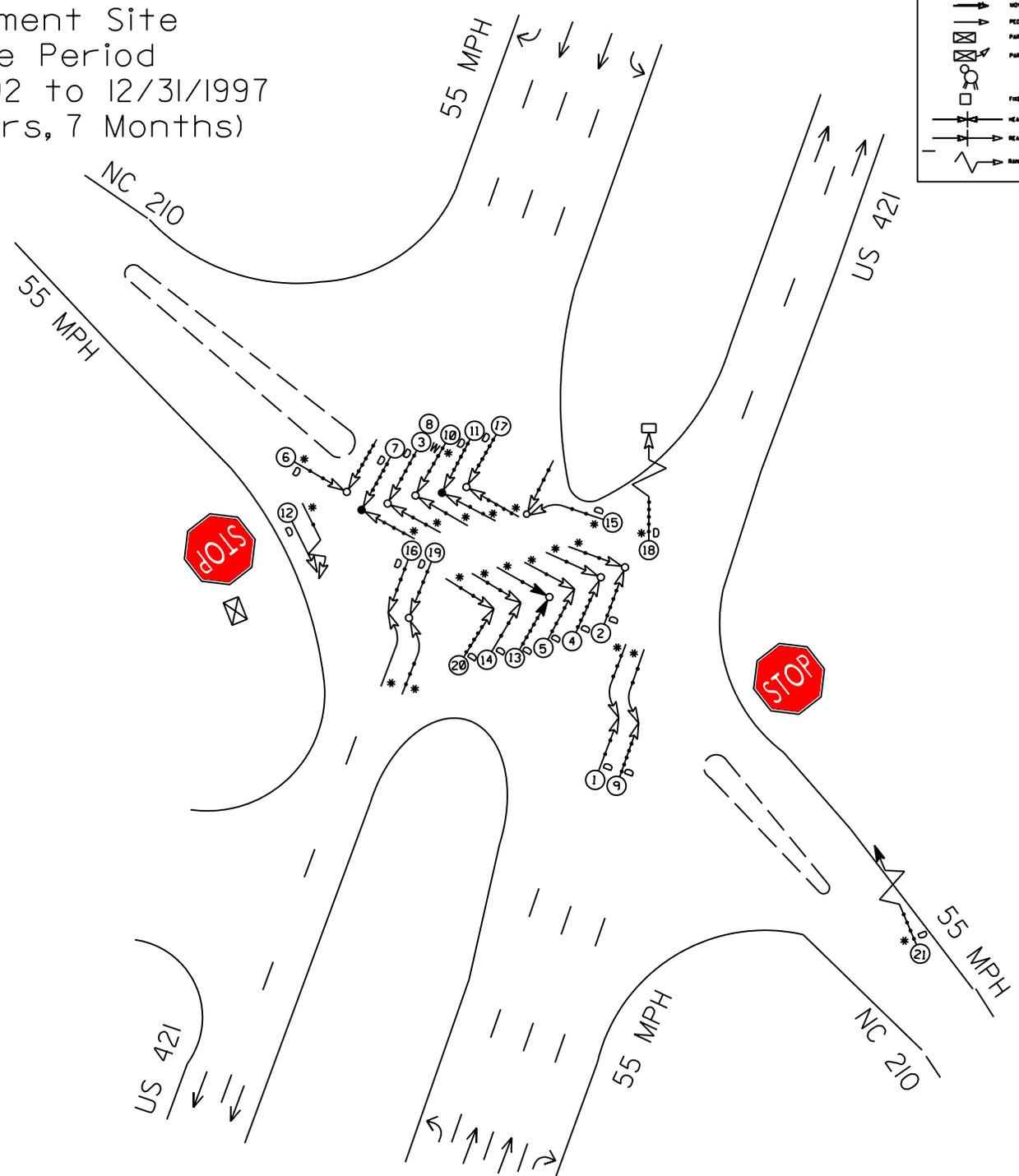


Looking west on NC 210

Treatment Site
 Before Period
 6/1/1992 to 12/31/1997
 (5 Years, 7 Months)

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PAKED VEHICLE		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE DRIVER AT FAULT		BACKING		20 MPH TO 29		DRIVER AT FAULT
	DEER		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		REAR END		50 MPH TO 59		TO AND UP
	RAN OFF ROAD		FATALITY		60 MPH TO 69		KEY OR SHOVEL
			SPEED UNKNOWN				O



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM
	DIVISION 3 AREA
	STUDY PERIOD: 6/1/1992 to 12/31/1997
	DISTANCE: 1-LINE + 0.5T
	ANALYSIS PREPARED BY: C GOODRICH
	ANALYSIS CHECKED BY: H SCHMID
	DIAGRAM PREPARED BY: H SCHMID
	DIAGRAM REVIEWED BY:

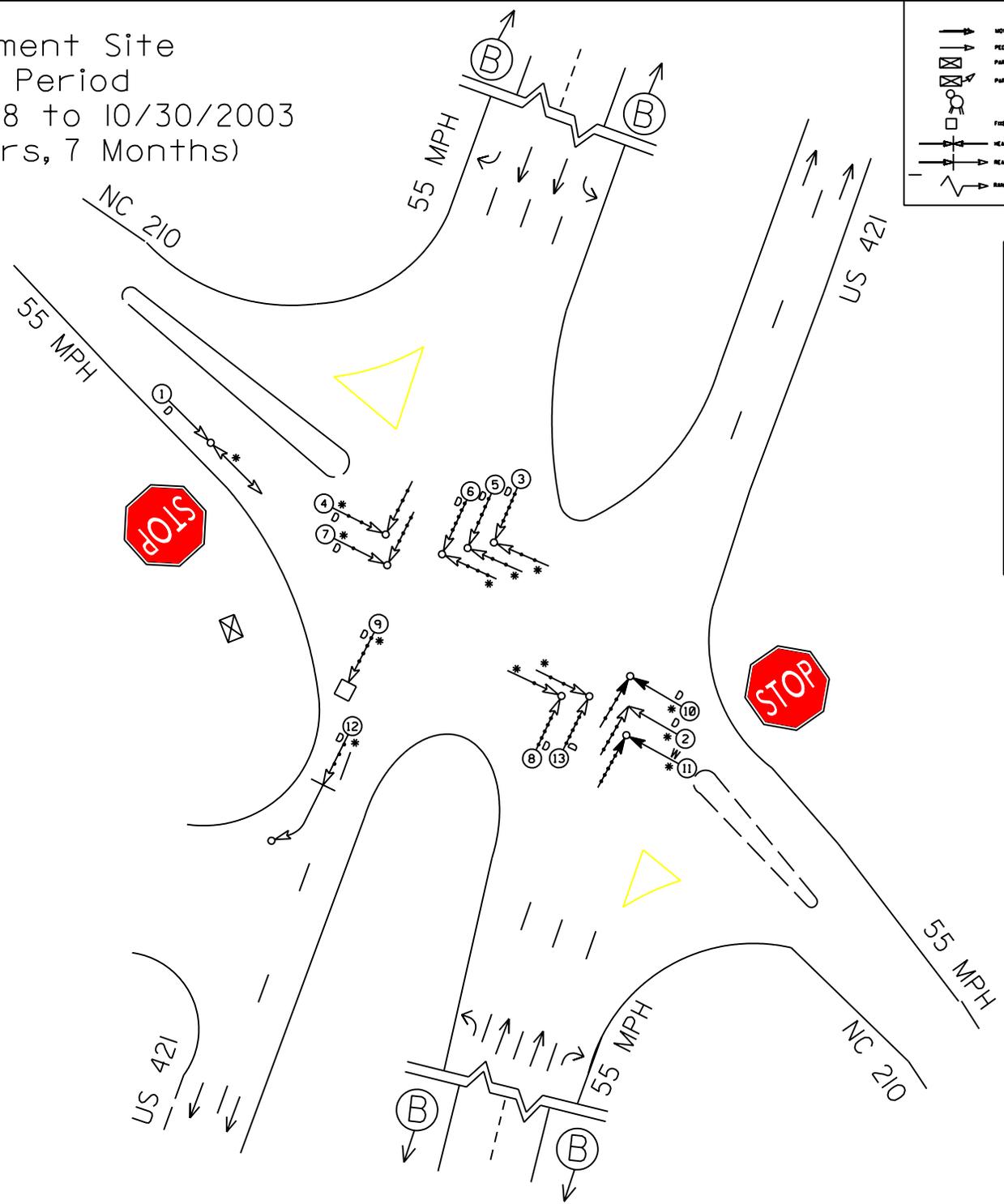
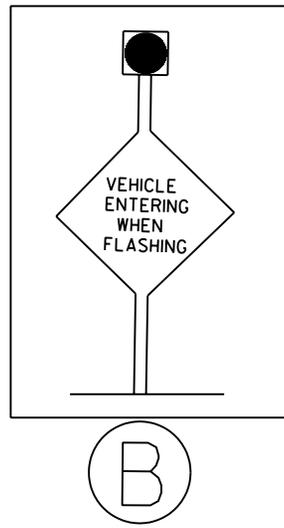
US 421 and NC 210
 BEFORE PERIOD
 SCALE: NOT TO SCALE
 DATE: July 26, 2004
 LOG NUMBER:

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH

Treatment Site
 After Period
 4/1/1998 to 10/30/2003
 (5 Years, 7 Months)

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PAKED VEHICLE		TURNING		10 MPH TO 19		TRAM
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	DEER		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		HAZY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		TO AND UP
	RAN OFF ROAD		SPEED UNKNOWN		70 AND UP		0 DOT



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM
	DRW006 3 AREA
	STUDY PERIOD: 4/1/1998 to 10/30/1991
	DISTRICT: 7 CASE # 5071
	ANALYSIS PREPARED BY: C GOODRICH
ANALYSIS CHECKED BY: H SCHWAB	
DIAGRAM PREPARED BY: H SCHWAB	
DIAGRAM REVIEWED BY:	

US 421 and NC 210
 AFTER PERIOD
 SCALE: NOT TO SCALE
 DATE: July 26, 2004
 LOC NUMBER:

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH